3-27-1980

# Test 1337: International Hydo 86 Diesel

Tractor Museum
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# NEBRASKA TRACTOR TEST 1337 — INTERNATIONAL HYDRO 86 DIESEL

## POWER TAKE-OFF PERFORMANCE

| Power Hp (kW) | Crank shaft speed rpm | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temperature °F (°C) Cooling medium | Air wet bulb | Air dry bulb | Barometer inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|
| **MAXIMUM POWER AND FUEL CONSUMPTION** | | | | | | | | |
| **Rated Engine Speed—Two Hours (PTO Speed—652 rpm)** | | | | | | | | |
| 70.89 (52.86) | 2400 | 5.298 (20.055) | 0.526 (0.320) | 13.38 (2.636) | 194 (90.2) | 67 (19.3) | 75 (23.8) | 28.917 (97.647) |
| **Standard Power Take-off Speed (540 rpm)—One Hour** | | | | | | | | |
| 66.64 (49.69) | 1988 | 4.700 (17.791) | 0.497 (0.302) | 14.18 (2.793) | 200 (93.5) | 67 (19.5) | 75 (23.7) | 28.900 (97.591) |
| **VARYING POWER AND FUEL CONSUMPTION—Two Hours** | | | | | | | | |
| 63.81 (47.58) | 2542 | 4.994 (18.904) | 0.551 (0.335) | 12.77 (2.517) | 193 (89.2) | 68 (20.0) | 75 (23.9) | ..... ..... |
| 0.00 (0.00) | 2669 | 2.135 (8.082) | ..... ..... | ..... ..... | 179 (81.7) | 68 (19.7) | 75 (23.9) | ..... ..... |
| 32.89 (24.53) | 2620 | 3.426 (12.969) | 0.733 (0.446) | 9.60 (1.891) | 185 (85.0) | 68 (20.0) | 75 (23.9) | ..... ..... |
| 70.83 (52.82) | 2400 | 5.301 (20.066) | 0.527 (0.321) | 13.36 (2.632) | 196 (90.8) | 69 (20.3) | 76 (24.2) | ..... ..... |
| 16.62 (12.39) | 2649 | 2.766 (10.470) | 1.172 (0.713) | 6.01 (1.183) | 181 (82.8) | 69 (20.6) | 75 (23.9) | ..... ..... |
| 48.62 (36.26) | 2582 | 4.134 (15.649) | 0.599 (0.364) | 11.76 (2.317) | 189 (87.2) | 70 (20.8) | 76 (24.4) | ..... ..... |
| **Av 38.79** | **2577** | **3.793** | **0.688** | **10.23** | **187** | **68** | **75** | **28.843** |
| ***Av (28.93)*** | | ***(14.358)*** | ***(0.419)*** | ***(2.015)*** | ***(86.1)*** | ***(20.2)*** | ***(24.1)*** | ***(97.400)*** |

## DRAWBAR PERFORMANCE

| Power Hp (kW) | Drawbar pull lbs (kN) | Speed mph (km/h) | Crank-shaft speed rpm | Slip % | Fuel Consumption gal/hr (l/h) | lb/hp.hr (kg/kW.h) | Hp.hr/gal (kW.h/l) | Temp. °F (°C) Cool-ing med | Air wet bulb | Air dry bulb | Barom. inch Hg (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maximum Available Power—Two Hours, Speed Setting — 4.0 MPH Lo Range** | | | | | | | | | | | |
| 52.49 (39.14) | 4868 (21.65) | 4.04 (6.51) | 2399 | 6.37 | 5.291 (20.029) | 0.710 (0.432) | 9.92 (1.954) | 198 (91.9) | 69 (20.3) | 75 (23.6) | 28.750 (97.084) |
| **75% of Pull at Maximum Power—Ten Hours, Speed Setting—4.0 MPH Lo Range** | | | | | | | | | | | |
| 44.13 (32.91) | 3780 (16.81) | 4.38 (7.05) | 2551 | 4.65 | 4.620 (17.489) | 0.737 (0.448) | 9.55 (1.882) | 196 (90.9) | 72 (22.1) | 85 (29.3) | 28.658 (96.774) |
| **50% of Pull at Maximum Power—Two Hours, Speed Setting—4.0 MPH Lo Range** | | | | | | | | | | | |
| 31.47 (23.46) | 2524 (11.23) | 4.67 (7.52) | 2589 | 3.11 | 3.817 (14.451) | 0.854 (0.520) | 8.24 (1.624) | 191 (88.3) | 72 (22.2) | 83 (28.1) | 28.695 (96.899) |
| **50% of Pull at Reduced Engine Speed—Two Hours, Speed Setting—8.42 MPH Hi Range at 2400 Engine RPM** | | | | | | | | | | | |
| 31.50 (23.49) | 2525 (11.23) | 4.68 (7.53) | 1358 | 3.25 | 2.770 (10.485) | 0.619 (0.377) | 11.37 (2.240) | 191 (88.1) | 61 (15.8) | 68 (19.7) | 28.915 (97.642) |
| **MAXIMUM POWER AT SELECTED TRAVEL SPEEDS** | | | | | | | | | | | |
| 48.06 (35.83) | 8815 (39.21) | 2.04 (3.29) | 2403 | 14.97 | The infinitely | | Lo R. | 192 (88.6) | 58 (14.4) | 61 (16.1) | 28.890 (97.557) |
| 52.66 (39.27) | 6546 (29.12) | 3.02 (4.86) | 2399 | 8.71 | variable drive | | Lo R. | 196 (91.1) | 59 (15.0) | 67 (19.4) | 28.830 (97.354) |
| 53.69 (40.03) | 5662 (25.19) | 3.56 (5.72) | 2400 | 7.32 | control was set | | Lo R. | 196 (91.1) | 58 (14.4) | 66 (18.9) | 28.840 (97.388) |
| 54.10 (40.34) | 5039 (22.41) | 4.03 (6.48) | 2398 | 6.44 | by the | | Lo R. | 196 (91.1) | 57 (13.9) | 65 (18.3) | 28.850 (97.422) |
| 53.88 (40.17) | 4430 (19.71) | 4.56 (7.34) | 2399 | 5.68 | manufacturer | | Lo R. | 197 (91.4) | 60 (15.6) | 69 (20.6) | 28.830 (97.355) |
| 53.41 (39.83) | 3960 (17.61) | 5.06 (8.14) | 2399 | 4.91 | to give the | | Lo R. | 196 (91.1) | 62 (16.7) | 70 (21.1) | 28.820 (97.321) |
| 52.26 (38.97) | 3524 (15.68) | 5.56 (8.95) | 2398 | 4.34 | travel speeds | | Lo R. | 196 (91.1) | 62 (16.7) | 70 (21.1) | 28.820 (97.321) |
| 51.12 (38.12) | 3155 (14.03) | 6.08 (9.78) | 2400 | 3.91 | shown. | | Hi R. | 197 (91.4) | 62 (16.7) | 70 (21.1) | 28.820 (97.321) |
| 52.02 (38.79) | 2959 (13.16) | 6.59 (10.61) | 2398 | 3.69 | | | Hi R. | 196 (91.1) | 63 (17.2) | 71 (21.7) | 28.810 (97.287) |
| 52.64 (39.25) | 2815 (12.52) | 7.01 (11.29) | 2399 | 3.54 | | | Hi R. | 196 (91.1) | 64 (17.8) | 71 (21.7) | 28.800 (97.253) |
| 53.27 (39.72) | 2643 (11.76) | 7.56 (12.16) | 2399 | 3.33 | | | Hi R. | 196 (90.8) | 65 (18.3) | 71 (21.7) | 28.790 (97.220) |
| 53.68 (40.03) | 2484 (11.05) | 8.10 (13.04) | 2399 | 2.88 | | | Hi R. | 196 (91.1) | 66 (18.9) | 71 (21.7) | 28.780 (97.186) |

**Department of Agricultural Engineering**

**Dates of Test:** March 27 to September 17, 1980

**Manufacturer:** INTERNATIONAL HARVESTER COMPANY, 401 North Michigan Avenue, Chicago, IL 60611.

**FUEL, OIL AND TIME: Fuel** No. 2 Diesel **Cetane No.** 47.9 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60° *(15°/15°)*** 0.8455 **Fuel weight** 7.040 lbs/gal *(0.844 kg/l)* **Oil SAE** 30 **API service classification** CA/CD-SC/SE **To motor** 4.995 gal *(18.906 l)* **Drained from motor** 4.813 gal *(18.217 l)* **Transmission and final drive lubricant** I.H. Hy-Tran Fluid **Total time engine was operated** 73.5 hours

**ENGINE Make** International Diesel **Type** 6 cylinder vertical **Serial No.** 310DT2D095469* **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 3.875″ × 4.375″ *(98.4 mm × 111.1 mm)* **Compression ratio** 15.1 to 1 **Displacement** 310 cu in *(5080 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** one paper element **Oil filter** one full flow cartridge **Oil cooler** radiator for hydraulic and transmission oil **Fuel filter** two paper elements **Muffler** vertical **Cooling medium temperature control** one thermostat

**CHASSIS: Type** standard **Serial No.** 2680028U009039* **Tread width** rear 50″ *(1270 mm)* to 96″ *(2438 mm)* front 56″ *(1422 mm)* to 82″ *(2082 mm)* **Wheel base** 103″ *(2616 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 32.3″ *(820 mm)* Vertical distance above roadway 35.5″ *(902 mm)* Horizontal distance from center of rear wheel tread 0″ *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** infinitely variable hydrostatic using a variable displacement pump and motor. A range transmission provides Hi and Lo range **Advertised speeds mph (km/h)** Lo range 0—8.0 *(0—12.9)*; Hi range 0—21.6 *(0—34.8)*; reverse Lo range 0—3.6 *(0—5.9)*, Hi range 0—9.8 *(0—15.8)* **Clutch** none-hydrostatic drive can be controlled by foot pedal **Brakes** double dry disc operated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 144″ *(3.66 m)* left 144″ *(3.66 m)* (on concrete surface without brake) right 165″ *(4.19 m)* left 165″ *(4.19 m)* **Turning space diameter** (on concrete surface with brake applied) right 298″ *(7.57 m)* left 298″ *(7.57 m)* (on concrete surface without brake) right 339″ *(8.61 m)* left 339″ *(8.61 m)* **Power take-off** 540 rpm at 1988 engine rpm.

**REPAIRS and ADJUSTMENTS:** No repairs. Fuel adjusted as shown below.

**REMARKS:** All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure. Temperature at injection pump return was 145°F *(62.8°C)*. Twelve travel speeds were chosen between 15% slip and 10 mph *(16.1*

**LUGGING ABILITY IN SPEED SETTING—4.0 MPH Lo Range**

| Crankshaft Speed rpm | 2398 | 2158 | 1918 | 1677 | 1440 | 1202 |
|---|---|---|---|---|---|---|
| Pull—lbs *(kN)* | 5039 *(22.41)* | 5582 *(24.83)* | 5926 *(26.36)* | 5939 *(26.42)* | 6086 *(27.07)* | 6063 *(26.97)* |
| Increase in Pull % | 0 | 11 | 18 | 18 | 21 | 20 |
| Power—Hp *(kW)* | 54.10 *(40.34)* | 53.29 *(39.74)* | 49.35 *(36.80)* | 43.23 *(32.24)* | 37.75 *(28.15)* | 31.35 *(23.38)* |
| Speed—Mph *(km/h)* | 4.03 *(6.48)* | 3.58 *(5.76)* | 3.12 *(5.03)* | 2.73 *(4.39)* | 2.33 *(3.74)* | 1.94 *(3.12)* |
| Slip % | 6.44 | 7.25 | 7.79 | 7.92 | 8.45 | 8.19 |

| TRACTOR SOUND LEVEL WITHOUT CAB | dB(A) |
|---|---|
| Maximum Available Power—Two Hours | 98.0 |
| 75% of Pull at Maximum Power—Ten Hours | 97.5 |
| 50% of Pull at Maximum Power—Two Hours | 96.0 |
| 50% of Pull at Reduced Engine Speed—Two Hours | 95.0 |
| Bystander in Hi Range | 90.5 |

| TIRES, BALLAST AND WEIGHT | | With Ballast | Without Ballast |
|---|---|---|---|
| **Rear Tires** | —No., size, ply & psi *(kPa)* | Two 18.4-34; 6; 16 *(110)* | Two 18.4-34; 6; 16 *(110)* |
| Ballast | —Liquid (each inner) | 1273 lb *(577 kg)* | None |
| | —Cast Iron (each) | None | None |
| **Front Tires** | —No., size, ply & psi *(kPa)* | Two 9.5L-15; 6; 36 *(250)* | Two 9.5L-15; 6; 36 *(250)* |
| Ballast | —Liquid (each) | None | None |
| | —Cast Iron (each) | None | None |
| **Height of drawbar** | | 19 in *(485 mm)* | 19 in *(485 mm)* |
| **Static Weight with Operator**—Rear | | 8220 lb *(3729 kg)* | 5675 lb *(2575 kg)* |
| Front | | 2490 lb *(1129 kg)* | 2490 lb *(1129 kg)* |
| Total | | 10710 lb *(4858 kg)* | 8165 lb *(3704 kg)* |

*km/h)*. Drawbar horsepower did not meet manufacturer's claim upon completion of first test sequence. The fuel rate was readjusted, the oil changed at 39 hours and the test repeated.

We, the undersigned, certify that this is a true and correct report of official Tractor Test **1337.**

LOUIS I. LEVITICUS
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Board of Tractor Test Engineers


**International Hydro 86 Diesel**